

CLAIMS

We claim:

- 1 1. An apparatus comprising:
 - 2 a therapeutic guidewire; and
 - 3 at least one optical fiber disposed through the therapeutic guidewire, the optical
 - 4 fiber configured to provide diagnostic information before, during, and after a
 - 5 therapeutic treatment.

- 1 2. The apparatus of claim 1 wherein the at least one optical fiber is exposed within
2 a vasculature of a patient at least at one location along the therapeutic guidewire.

- 1 3. The apparatus of claim 2 wherein the at least one optical fiber is configured to
2 sense vessel and blood characteristics.

- 1 4. The apparatus of claim 3 wherein the vessel and blood characteristics are
2 selected from the group consisting of hemodynamic characteristics, hematological
3 parameters related to blood and blood components and thermal parameters of the
4 vasculature.

- 1 5. The apparatus of claim 1 wherein the therapeutic guidewire is operatively
2 coupled to a catheter.

- 1 6. An apparatus comprising:
 - 2 a therapeutic guidewire configured to operatively receive a treatment device;
 - 3 and

4 at least one optical fiber disposed within the therapeutic guidewire to sense
5 vessel and blood characteristics.

1 7. The apparatus of claim 6 wherein the treatment device is selected from the
2 group consisting of intravascular device, intraluminal device, intraductal device and
3 intraorgan device.

1 8. The apparatus of claim 6 wherein the at least one optical fiber is movable within
2 the therapeutic guidewire.

1 9. The apparatus of claim 6 wherein the at least one optical fiber is exposed within
2 a vasculature of a patient at least at one location along the therapeutic guidewire.

1 10. The apparatus of claim 6 wherein the vessel and blood characteristics are
2 selected from the group consisting of hemodynamic characteristics, hematological
3 parameters related to blood and blood components and thermal parameters of the
4 vasculature.

1 11. The apparatus of claim 6 wherein the therapeutic guidewire comprises:
2 an elongated guidewire body having a distal core section axially coupled to a
3 proximal core section by a connecting member; and
4 an atraumatic distal tip formed at a distal end of the distal core section.

1 12. The apparatus of claim 11 wherein the therapeutic guidewire further comprises
2 a flexible coil disposed about the distal core section of the elongated guidewire body,
3 the flexible coil coupled to at least one point along the distal core section.

1 13. The apparatus of claim 11 wherein the therapeutic guidewire further comprises
2 a shaping ribbon coupled to the distal core section.

1 14. The apparatus of claim 11 wherein the at least one optical fiber is coupled to the
2 elongated guidewire body at least at one point along thereon.

1 15. The apparatus of claim 11 wherein the at least one optical fiber is movable
2 within the elongated guidewire body.

1 16. The apparatus of claim 11 wherein the distal core section has at least one
2 opening to allow the optical fiber to be exposed to a vasculature of a patient.

1 17. The apparatus of claim 16 wherein the at least one optical fiber is configured to
2 sense vessel and blood characteristics selected from the group consisting of
3 hemodynamic characteristics, hematological parameters related to blood and blood
4 components and thermal parameters of the vasculature.

1 18. The apparatus of claim 5 wherein the at least one optical fiber is marked with a
2 radiopaque substance.

1 19. The apparatus of claim 12 wherein theatraumatic distal tip includes a clear
2 polymeric material sheath coupled to the distal end of the flexible coil.

1 20 The apparatus of claim 11 wherein theatraumatic distal tip is formed by using a
2 metal.

1 21. The apparatus of claim 11 wherein the therapeutic guidewire further comprises
2 a clear polymeric jacket disposed about the distal core section, the clear polymeric
3 jacket coupled to at least one point along an outer surface of the distal core section, the
4 atraumatic distal tip coupled to a distal end of the clear polymeric jacket.

1 22. A system for sensing vessel and blood characteristics, the system comprising:
2 a data processing system; and
3 an apparatus coupled to the data processing system, the apparatus comprising a
4 therapeutic guidewire and at least one optical fiber disposed therein, the optical fiber
5 capable to sense vessel and blood characteristics.

1 23. The system of claim 22 wherein the vessel and blood characteristics are selected
2 from the group consisting of hemodynamic characteristics, hematological parameters
3 related to blood and blood components and thermal parameters of the vasculature.

1 24. A method of sensing vessel and blood characteristics, the method comprising:
2 inserting an apparatus into a vasculature of a patient, the apparatus comprising a
3 therapeutic guidewire and at least one optical fiber disposed therein, the optical fiber
4 configured to provide diagnostic information before, during, and after the therapeutic
5 treatment;
6 advancing the apparatus to a desired location in the vasculature;
7 operating a data processing system coupled to the apparatus such that light
8 signals are transmitted to the desired location in the vasculature and reflected light
9 signals are collected by the data processing system; and
10 processing the reflected light signals to provide vessel and blood characteristics.

1 25. The method of claim 24 wherein the vessel and blood characteristics are
2 selected from the group consisting of hemodynamic characteristics, hematological
3 parameters related to blood and blood components and thermal parameters of the
4 vasculature.